成層圏突然昇温と高緯度中間圏・下部熱圏・電離圏の熱構造および力学との関係

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Links between a stratospheric sudden warming and thermal structures and dynamics in the high-latitude mesosphere, lower thermosphere, and ionosphere

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We analyzed neutral winds, diffusion coefficients, and neutral temperatures observed by the Nippon/Norway Tromsø Meteor Radar (NTMR) and ion temperatures observed by the European Incoherent Scatter (EISCAT) UHF radar at Tromsø (69.6ºN, 19.2 ºE), during a major stratospheric sudden warming (SSW) that occurred in January 2009.

The zonal winds at 80-100 km height reversed approximately 10 days earlier than the zonal wind reversal in the stratosphere and the neutral temperature at 90 km decreased simultaneously with the zonal wind reversal at the same altitude.

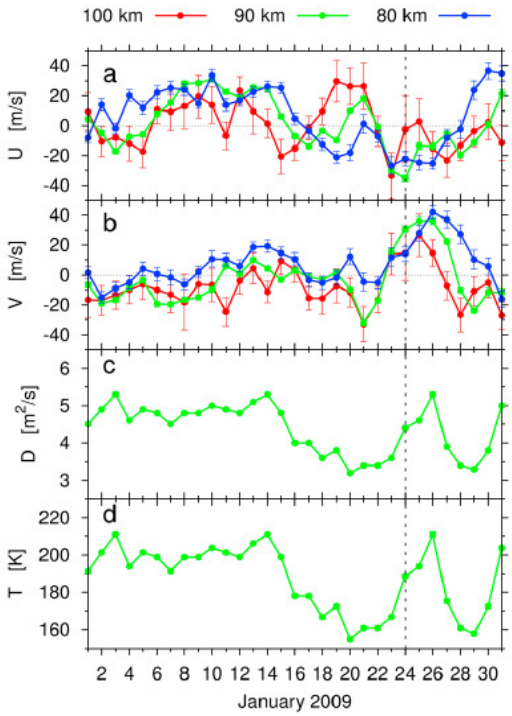

Figure 1. (a) Zonal wind, (b) meridional wind, (c) ambipolar diffusion coefficient, and (d) temperature variations derived from the NTMR data.

We found different variations between geomagnetically quiet nighttime ion temperatures at 101-110 km and 120-142 km for about 10 days around the SSW. Our results from the ground-based observations agree well with the satellite observations shown in an accompanying paper (Funke et al., 2010). Thus this study indicates that a SSW is strongly linked to thermal structure and dynamics in the high-latitude mesosphere, lower thermosphere, and ionosphere.

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